

HIMMELSTEIN EXHIBIT 2

III REDUCING RISK OF INJURY AND DISEASE

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Prevention: A Brief Overview

Over the past several decades, disease and injury prevention has occupied an expanding share of medical practice. Public interest in prevention is very high, driven by a steady accumulation of high-quality evidence that preventive interventions do reduce cause-specific death rates. The purpose of these interventions is to eliminate the root causes of diseases that precede death (e.g., heart disease, cancer, and stroke), which in the United States in 2000 were tobacco use (435,000 deaths), poor diet and inadequate physical activity (400,000 deaths), alcohol consumption (85,000 deaths), microbial agents (75,000 deaths), toxic agents (55,000 deaths), motor vehicle accidents (25,000 deaths), firearms (29,000 deaths), sexual behaviors (20,000 deaths), and use of illicit drugs (17,000 deaths).¹ These causes of death are the targets of disease and injury prevention. They contribute to 48.2% of the deaths in the United States. Most are simply the result of bad habits, and changing those habits reduces the risk of dying.

Physicians have two principal roles in prevention: they identify risk factors for disease and injury, and they act as teachers and counselors. To fill those roles completely, physicians must expand their routine questioning beyond diet, exercise, and substance abuse to include recreational activities that increase the risk of death (e.g., boating, bicycling, and riding motorcycles), gun ownership, use of swimming pools, smoke detectors in the home, and domestic violence. In counseling patients about a healthy diet (including vitamin supplements), exercise, and other elements of a healthy lifestyle, physicians must often help patients adopt healthy living habits.

The United States Preventive Services Task Force (USPSTF)² is the most important source of evidence-based guidelines for prevention [see Table 1]. The USPSTF publishes guidelines on many prevention topics in medical journals (principally *Annals of Internal Medicine*); a full listing of the preventive services currently recommended by the USPSTF appears on its Web site (<http://www.ahrq.gov/clinic/pocketgd/index.html>). The USPSTF grading system for evidence is discussed elsewhere [see CE.V Adult Preventive Health Care].

CAVEATS IN DISEASE AND INJURY PREVENTION

Although disease and injury prevention can have a significant effect on the health of the public, physicians should observe several caveats. First, the baseline risk of most diseases is very low in the average person. Each year, colon cancer occurs in 165 per 100,000 men 60 to 64 years of age. The low baseline risk means that the number needed to screen or treat to prevent one death is often very high. Annual fecal occult blood testing must be performed on more than 300 people for 12 years to prevent one death from colon cancer. Fecal occult blood testing can be costly because it must be performed annually and because abnormal results trigger costly diagnostic tests. Seat belts and smoke alarms are very cost-effective because they incur a onetime cost.

Second, disease prevention does not prevent death. At best, it postpones death by shifting the cause of death from the targeted disease to another disease that strikes later in life. In the Minnesota Colon Cancer Control Study,³ a randomized trial of fecal occult blood testing, annual testing reduced deaths from colon cancer during 18 years of surveillance. However, the total mortality was the same in the control group and the intervention groups. By reducing the likelihood of death from the target disease, we inevitably raise the lifetime probability of dying from another disease.

Table 1 Recommendations of the United States Preventive Services Task Force²

Risk	Action	Rating of Evidence*
Alcohol misuse	Screening and behavioral counseling interventions to reduce alcohol misuse by adults, including pregnant women	B
	Screening and behavioral counseling interventions to prevent or reduce alcohol misuse by adolescents	I
Tobacco use	Screen adults for tobacco use and provide tobacco cessation interventions for those who use tobacco products	A
	Screen pregnant women for tobacco use and provide augmented pregnancy-tailored counseling to those who smoke	A
	Routine screening of children or adolescents for tobacco use or interventions to prevent and treat tobacco use and dependence	I
Motor vehicle injury	Counsel on proper use of occupant restraints (child safety seats, booster seats, and lap-and-shoulder belts)	I
Family violence	Screening of parents or guardians for the physical abuse or neglect of children, of women for intimate partner violence, or of older adults or their caregivers for elder abuse	I

*Rating scale: A—Strongly recommended B—Recommended C—No recommendation D—Recommended against I—Evidence is insufficient to recommend for or against

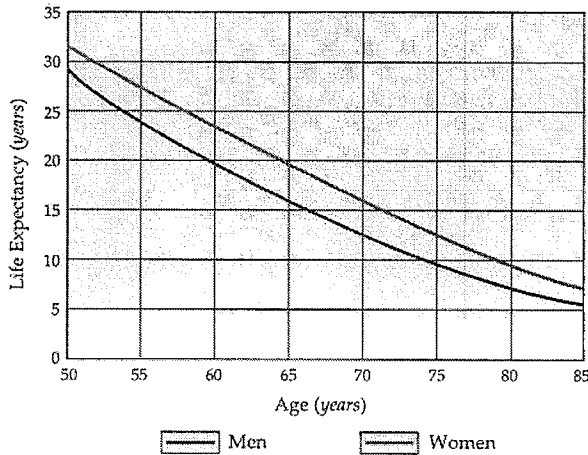


Figure 1 Life expectancy of men and women in the United States.

Third, the term prevention is a misnomer; risk reduction would be more accurate. For example, although use of seat belts reduces the risk of death in an automobile accident, many persons nevertheless die of injuries sustained while wearing a seat belt.

Fourth, we know little about the age at which we should stop our efforts to prevent a given disease. The incidence of most diseases increases with advancing age (cervical cancer is an exception), which makes them more attractive targets for prevention. On the other hand, interventions that take 10 to 15 years to show their impact may be ill suited to persons whose life expectancy is measured in a few years rather than decades.

The decision to do a screening test on an older person should depend on the person's general health, which may be quantified as the person's physiologic age. The physician can determine a patient's physiologic age by asking the patient to rate his or her health as excellent, good, fair, or poor.⁴ The most likely age at death is the sum of the patient's actual age and the life expectancy that corresponds to the patient's physiologic age. For example, a 75-year-old man in excellent health has a physiologic age of 67 years, which corresponds to a 14.7-year life expectancy [see Figure 1]. The most likely age at death is 75 years plus 14.7 years, or 90 years. This information can be very helpful in deciding how hard to press preventive efforts. With a life expectancy of almost 15 years, a 75-year-old man has plenty of time in which to experience gains from preventive efforts.

CHANGING BEHAVIOR

Many interventions of proven efficacy are not fully implemented because patients are reluctant to change long-established risky behaviors. The USPSTF recommends the following steps for helping patients use their ability to change (self-efficacy):⁵

1. Match teaching to the patient. Identify a patient's beliefs about a behavior, and adjust advice to the patient's lifestyle. Building the patient's confidence in his or her ability to change requires recognizable successes; define success in terms of goals the patient can achieve.
2. Tell why, what, and when. Patients need to know the reason for a recommendation and the results of following the recommendation. They must also know the time scale for the results so that they do not become discouraged when results do not occur immediately.

Table 2 Years of Smoking Abstinence Needed to Reduce Risk of Disease^{2,9}

Disease	Years until Risk Is Half of a Current Smoker's Risk	Years until Risk Is Equal to a Never-smoker's Risk
Recurrent myocardial infarction or death from coronary artery disease	1	15
Stroke	2-4	5-15
Oral and esophageal cancer	5	—
Lung cancer	10	20

3. Small changes succeed. As the patient achieves small successes, propose larger but achievable goals.
4. Be specific. Couch suggestions in terms of current behavior, and give precise instructions in writing.
5. Add new behaviors. Adopting good habits is often easier than discarding bad ones.
6. Link positive behaviors with the daily routine. For example, patients can be encouraged to exercise before lunch or to take medication immediately after brushing teeth.
7. Do not mince words. Tell the patient directly, simply, and specifically what you want and why.
8. Extract promises. Get explicit commitments from the patient. Have the patient tell you exactly how he or she will achieve a goal. Assess the patient's self-confidence and address concerns about succeeding.
9. Use combination strategies. An approach that combines several strategies is more likely to succeed than a single strategy.
10. Involve others. Members of the physician's office staff can become educators. Anyone can offer encouragement to patients.
11. Refer. Subspecialists in many chronic diseases have trained teams that can educate patients far more effectively than individual physicians can. Another form of referral is sending novice patients to talk with successful patients.
12. Stay interested. According to research findings, a call from a health professional to inquire about progress is very effective in changing a behavior. A well-organized office will have a protocol for making these calls a matter of routine.

Health Risks from Substance Abuse

Substance abuse exacts a large toll on the health of the American people, accounting for at least 537,000 deaths in 1990, or about 22% of all deaths.¹ Unfortunately, many physicians do not

Table 3 Elements of a Successful Smoking Cessation Strategy

- Direct, face-to-face advice and suggestions
- Reinforcement, especially in first 2 weeks
- Office reminders: a sticker on chart of smokers may stimulate physician to deliver antitobacco message at each visit
- Self-help materials
- Community programs for additional help
- Drug therapy

Table 4 Stages of Readiness for Smoking Cessation¹²

Stage	Patient Attitude	Physician Intervention
Precontemplation	Thinks smoking is not a problem	Educate the patient about the effects of smoking; introduce ambivalence by inquiring about decision to continue smoking; express concern; recommend quitting
Contemplation	Thinks smoking may be a problem	Assess positive and negative thinking about smoking
Preparation	Wants to quit smoking	Set a quit date, select smoking cessation strategies, determine dosage of nicotine replacement if indicated, identify triggers for smoking, gather social support for quitting, begin bupropion if indicated
Action	Quits smoking	Begin nicotine replacement and continue bupropion

place diseases resulting from self-abuse in the same category as diseases that strike seemingly by chance. Two factors make helping patients shed their habitual use of tobacco, alcohol, and illicit drugs a very efficient way for physicians to add healthy years to patients' lives. First, there is a high baseline risk that substance abuse will lead to serious disease. Therefore, the absolute reduction in risk from a successful intervention is high. This principle is especially true of substance abuse during pregnancy. Second, substance abuse is primarily a problem of youth and middle age, and any intervention that reduces the risk of early death in that age group can add many years of healthy life.

TOBACCO USE

Tobacco contains an addictive drug, nicotine, as well as other substances that contribute to death from cardiovascular disease, cancer, and chronic lung disease. Smoking also contributes to 10% of infant deaths and 20% to 30% of low-birth-weight infants.⁵ Tobacco use contributed to almost one in every five deaths in the United States in 2000 (435,000 deaths a year). In one 40-year cohort study of male physicians in the United Kingdom, half of the deaths after age 35 were smoking related, and smoking caused 25% of the residential fires that resulted in death.⁶ Tobacco use is less common in the United States than it was several decades ago, but 23% of adults smoke.¹ In girls, decreases in smoking prevalence that occurred in the 1970s and 1980s were negated by increases during the 1990s; rates of smoking in high school senior girls were the same in 2000 as in 1988.⁷

Cigarettes are highly addictive. Fewer than 10% of people who quit smoking for a day are still abstinent 1 year later. Nicotine, like other highly addictive substances, acts on the dopaminergic mesolimbic pathway, the brain reward pathway that controls motivated behaviors [see 13:VI *Drug Abuse and Dependence*]. The use of nicotine is self-reinforcing, leading to compulsive use. Nicotine produces a withdrawal syndrome that begins within a few hours of abstinence, peaks within the first week, and continues for several weeks. The withdrawal syndrome includes dysphoria, insomnia, irritability, anxiety, difficulty in concentrating, restlessness, slowed heart rate, and increased appetite.⁸

Detection of cigarette smoking is easy; most smokers are truthful when asked about their habit and its extent, and the odor of tobacco or stained fingers are additional diagnostic clues. Smoking cessation reduces mortality substantially. The risk of some diseases (e.g., myocardial infarction and stroke) declines rapidly within a few years after quitting [see Table 2].⁹ This information is important when one is trying to convince long-term smokers to quit.

Research has shown that a strong message from a personal physician is the most important factor in successful quitting. The

elements of successful quitting are consistent, repeated, and strong advice to stop smoking; setting a specific quit date; and follow-up visits to reinforce behavior [see Table 3]. However, not all physicians counsel smokers to quit. In one study, less than 50% of cigarette smokers reported that their physician had advised them to quit.¹⁰

A current theory in behavioral psychology suggests that changes in behavior reflect predictable stages in the readiness to change, ranging from no intention to change, to definite plans to change in the near future, to active attempts at change. A stage of readiness to change is predictive of quitting,¹¹ and this behavioral model may help clinicians shape smoking-cessation efforts to the patient's readiness to quit [see Table 4].¹²

School-based prevention has received extensive study, and its effects last for at least 2 to 4 years. Clinicians, especially those caring for adolescents, must reinforce the messages of school-based programs.

Weight gain is a common occurrence in patients who have stopped smoking. The average weight gain in a national sample of adults who had stopped smoking was 4.4 kg for men and 5.0 kg for women.¹³ Younger age, lower socioeconomic status and heavier smoking are predictors of higher weight gain.¹⁴ According to surveys, women smokers who are concerned about weight are especially unlikely to seek treatment or to attempt quitting on their own.¹⁵

Mechanisms for weight gain after smoking cessation include increased energy intake, decreased resting metabolic rate, decreased physical activity, and increased lipoprotein lipase activity.¹⁴ Weight gain also appears to be related to increases in food reward, which is partly determined by genetic factors and can be attenuated with bupropion.¹⁶ Smoking can impair glucose tolerance and insulin sensitivity, and smoking cessation seems to improve insulin sensitivity, despite weight gain.¹⁴

Nicotine Replacement Therapy

Nicotine products are an important adjunct to counseling.¹⁷⁻¹⁶ Drugs are most reinforcing when their level in brain tissue rises very rapidly, as with inhaled nicotine. Nicotine in medication form, especially transdermal products, appears in the blood much more slowly than inhaled nicotine and produces much less of the reinforcing effect that leads to craving for cigarettes. Plasma nicotine concentrations after transdermal administration reach stable levels in 2 to 3 days. Nicotine medications reduce the symptoms of withdrawal, so that symptoms in the first week are reduced to the level of symptoms at 5 to 10 weeks after quitting. Nicotine medications may also provide some nicotinellike effects, such as helping patients to sustain concentration and deal with stress. Nicotine medications improve abstinence rates,

Table 5 Test Performance of Screening Questionnaires for Alcohol Abuse²

Screening Instrument	Number of Items	Sensitivity (%)	Specificity (%)	Likelihood Ratio Positive	Likelihood Ratio Negative
MAST	25	84–100	87–95	10.2	0.10
CAGE	4	74–89	79–95	6.3	0.21
AUDIT*	10	96	96	24	0.04
AUDIT [†]	10	61	90	6.1	0.43

*In inner-city clinic population.

†In rural clinic.

AUDIT—Alcoholism Use Disorders Identification Test CAGE—see Table 6 MAST—Michigan Alcoholism Screening Test

but abstinence at 1 year is still the exception. A meta-analysis summarized the results of 46 trials of nicotine gum and 20 trials of nicotine patches.¹⁸ At 12 months, 19% of patients who received nicotine gum were abstinent, as compared with 11% of patients who did not receive gum. The number needed to treat to achieve one success at 1 year (NNT) was 17 ($P < 0.001$). Transdermal nicotine led to similar rates. At 12 months, 16% of patients who received a transdermal nicotine patch had quit smoking, as compared with 9% who did not receive the patch (NNT, 16).

The dose of nicotine medications should depend on the degree of nicotine dependence.¹⁸ The score on the Fagerstrom questionnaire²⁰ and the number of cigarettes a day are measures of dependence. Follow-up calls at prearranged times will help the patient to maintain abstinence. Many physicians designate a specific member of the physician's office staff to be the smoking-cessation coordinator and to make these follow-up calls.

The starting dose of nicotine gum (nicotine polacrilex) is 2 mg per two cigarettes; in patients who smoke more than 20 cigarettes a day, the dose should be 4 mg per three or four cigarettes. Patients may take additional unit doses if their withdrawal symptoms are unpleasant. The medication should be taken at regular intervals throughout the waking hours. The patient should compress the gum a few times with the teeth and then hold it in the mouth, repeating the cycle every minute or so for 15 to 30 minutes for each dose. After 1 to 2 months, weaning can begin with a reduction of 1 unit dose a week. With transdermal nicotine, patients who smoke more than 10 cigarettes a day should use the largest patch (21 mg). After 1 to 2 months, weaning can begin with each of the lower doses (usually 14 mg and 7 mg, respectively), prescribed for 2 to 4 weeks. Patients who smoke fewer than 10 cigarettes a day can start with the 14 mg dose. A hairless site allows the best absorption. The patient should rotate sites to avoid skin irritation.

Nicotine medications are quite safe¹⁸—certainly safer than cigarette smoking—even for patients with cardiovascular disease. The only contraindication is hypersensitivity to nicotine or to a component of the delivery system. Around-the-clock application of transdermal medication can result in sleep disturbance, which subsides if the medication is removed before sleep. Nicotine medication during pregnancy is of concern but probably of less concern than heavy smoking during pregnancy. Medication during pregnancy should be reserved for women who have failed to quit without medication and who smoke more than 10 to 15 cigarettes a day. Dependence on nicotine medications is most likely with delivery systems such as a nasal spray, which causes a rapid rise in the plasma nicotine concentration, and a small number of patients will still be using nicotine medication 1 year after starting treatment.

Other Drugs for Smoking Cessation

Nicotine therapy is not the only pharmacologic approach to smoking cessation. Clonidine also increases the rate of abstinence at 12 months. Side effects, particularly dry mouth and sedation, may limit the efficacy of clonidine.²¹

Another approach focuses on dopamine. Nicotine releases norepinephrine in the brain and increases dopamine in areas of the brain associated with reinforcing the effects of addictive substances, such as opioids. Bupropion potentiates the effect of norepinephrine and dopamine by acting as a weak inhibitor of their neuronal uptake. Thus, bupropion can mimic some of the central nervous system effects of nicotine and act as a substitute for nicotine in people who are trying to quit cigarettes. Randomized clinical trials have shown that abstinence rates are approximately twice as high with bupropion as with placebo.²² In one trial, for example, the rates of abstinence from tobacco at 1 year were 14% for those taking placebo and 25% for those taking 150 mg of bupropion twice daily.²² Side effects of bupropion include agitation and insomnia. Seizures are very uncommon when the daily dose of bupropion is 300 mg or less.

The recommended dose of bupropion is 150 mg/day for the first 3 days and then 150 mg twice daily. The patient should wait to stop smoking until he or she has been on bupropion for 1 week. There are no peer-reviewed reports comparing nicotine-replacement products with bupropion or detailing possible synergy between the two drugs.

The newest approach to smoking cessation is the use of nicotinic receptor antagonists to block the response to nicotine in cigarette smoke. The partial nicotinic receptor agonist varenicline has been shown to increase the odds of successful long-term smoking cessation approximately threefold compared with pharmacologically unassisted quit attempts.^{23,24} In trials reported so far, more participants quit successfully with varenicline than with bupropion.

The Food and Drug Administration approved the use of varenicline for smoking cessation in May 2006. The dosage for the first 3 days is 0.5 mg once a day, followed by 0.5 mg twice a

Table 6 The CAGE Questionnaire

- C: Have you ever felt you ought to Cut down on drinking?
- A: Have people Annoyed you by criticizing your drinking?
- G: Have you ever felt bad or Guilty about your drinking?
- E: Have you ever had a drink in the morning to steady your nerves or get rid of a hangover (Eye-opener)?

day for the next 4 days, then 1 mg twice a day for the remainder of the 12-week treatment period. Patients who are able to quit smoking with varenicline may continue the drug for an additional 12 weeks of treatment; this further increases the likelihood of long-term success.

As of November 2007, the FDA began recommending that clinicians monitor patients who are taking varenicline for behavior and mood changes.²⁶ In addition, because the use of varenicline has been associated with drowsiness, patients should use caution when driving or operating machinery until they know how varenicline may affect them. The most common side effect of varenicline is nausea.

ALCOHOL ABUSE

Habitual excessive alcohol consumption causes 85,000 deaths annually in the United States.¹ Although more than one million adults are under treatment for alcoholism, a far greater number engage in drinking that injures their health or has social consequences. The Institute of Medicine estimates that 20% of the population of the United States are problem drinkers, but only 5% are alcohol dependent.²⁷ Therefore, it is important to distinguish alcohol dependence from problem drinking. Alcohol dependence is associated with major withdrawal symptoms, tolerance, and preoccupation with drinking. Problem drinking is a less severe condition. Problem drinkers are younger, have a shorter drinking history, have fewer alcohol-related job problems, and have better social resources. In community surveys, the prevalence of problem drinking is highest in young men (17% to 24% in 18- to 29-year-olds) and lowest in men and women older than 65 years (1% to 3% and less than 1%, respectively). Women are more frequently problem drinkers than alcohol dependent.

Problem drinking has consequences that affect others, such as motor vehicle accidents, fetal-alcohol syndrome, unsafe sex, domestic violence, and psychological damage to children of problem drinkers. Binge drinking, which is especially prevalent in young adults, leads to violence, unsafe sex, and drunk driving.

Screening for problem drinking and alcohol dependence can be time consuming, and most methods are inaccurate. The gold-standard test for alcoholism is the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) criteria; however, the use of DSM-IV criteria for diagnosis requires a detailed interview and thus is not suitable for screening. Results of physical examination and laboratory tests are often normal in problem drinkers. Screening questionnaires such as the modified Michigan Alcoholism Screening Test (MAST), the Alcohol Use Disorders Identification Test (AUDIT), and the CAGE test are the most accurate instruments for detecting problem drinking² [see Tables 4, 5, and 6 and 13:III *Alcohol Abuse and Dependency*]. The questions in the MAST and CAGE instruments focus on alcohol dependence and are much less sensitive or specific for binge drinking. The AUDIT screening instrument⁴ may be more generally useful because it also asks about quantity of alcohol imbibed, frequency of drinking, and binge behavior. The CAGE and MAST questionnaires may also fail to detect a level of alcohol use that is dangerous during pregnancy.

The treatment of problem drinking depends on the severity of the problem. Problem drinkers often respond to brief office interventions (as short as 10 or 15 minutes), which use motivational techniques such as goal setting, contracts, and enhancing self-efficacy. In most instances, the goal is usually controlled moderate drinking rather than abstinence. The first step toward successful counseling is to get the patient to recognize that their drinking is

a problem. It is important to help the patient see a relationship between drinking and current medical or psychosocial problems. Strong advice to reduce consumption is also important. Regular follow-up visits to monitor progress are just as important for problem drinkers as they are for patients with high blood pressure.²⁸ A meta-analysis of 21 randomized, controlled trials in 7,286 participants showed that participants receiving brief intervention reduced their alcohol consumption compared with the control group (mean difference: -41 g/week, 95% confidence interval: -57 to -25 g), although there was substantial heterogeneity between trials.²⁹ Subgroup analysis of eight studies that separated data by gender showed that the effect of brief intervention was clear in men at 1 year of followup, but unproven in women. Compared with brief intervention, extended intervention appeared to offer little additional effect.²⁹

An excellent guide to managing problem drinking is available from the National Institute on Alcohol Abuse and Alcoholism (http://pubs.niaaa.nih.gov/publications/Practitioner/CliniciansGuide2005/clinicians_guide.htm)

In contrast to brief office-based interventions for problem drinking, successful treatment of alcohol dependence requires intensive therapy from specialists in substance abuse. A randomized trial of employees with alcohol dependence showed the importance of intervening intensively. Participants were randomly allocated to compulsory 3-week hospitalization followed by 1 year of attendance at Alcoholics Anonymous (AA) meetings, mandatory attendance at AA meetings at least three times a week, or a choice of treatment. Rates of being fired from work were similar in all groups, but rates for hospitalization for additional alcohol treatment were much lower in the mandatory-hospitalization group.³⁰

The personal physician does have an important role to play in the management of patients with alcohol dependence. In addition to managing medical complications of alcoholism, physicians should be able to use adjunctive therapy for alcohol dependence, such as naltrexone. Another key role for the personal physician is encouragement. Patients need to know that the abstinence rate can be as high as 60% at 10 years after intensive treatment. Finally, the personal physician can lead efforts to help patients solve life problems that are contributing to alcohol dependence.

DRUG ABUSE

The abuse of illicit and legal drugs is a large problem in the United States. A 2003 household survey showed that use of illicit drugs within the previous month peaked among 18 to 20 year olds, at 23.3%, and declined steadily with increasing age. Casual use of marijuana accounts for most of these reports, but as many as 2.3 million Americans use cocaine weekly and 119,000 use heroin.³¹

The drug abuser is at risk for many medical complications, but the social cost of drug abuse far outweighs the personal costs. Illicit drug use plays a major role in spreading HIV infection and in homicide, suicide, and motor vehicle accidents. The health care costs of drug abuse are estimated to be \$3.2 billion annually, and the cost of the largely unsuccessful federal and state government efforts to stem the flow of illicit drugs is several times higher [see 13:VI *Drug Abuse and Dependence*].

Many professional organizations recommend that physicians ask about drug abuse as part of a periodic health examination of a well person. However, learning about drug abuse may be difficult in the office setting. Patients may be unwilling to acknowl-

edge drug abuse until presented with incontrovertible evidence or after persistent questioning by an alerted physician. The accuracy of the history or questionnaires in detecting drug abuse is largely unknown.

Toxicologic testing is the best way to detect illicit drug use. Compared with reference tests, current tests can detect drugs in the urine with 99% sensitivity. However, detection depends on how much time has elapsed between the last drug exposure and provision of a urine specimen for testing. Marijuana is detectable up to 14 days after use, whereas cocaine, opiates, amphetamines, and barbiturates are present for only 2 to 4 days after use.

Although physicians sometimes test for illicit drugs without obtaining the patient's consent, they do so in the context of trying to determine the cause of a clinical problem that could be caused by an illicit drug. Whether it is ethical to test for illicit drugs without informed consent in an apparently healthy person who is at high risk for drug abuse is an open question. Regardless of the circumstances leading to testing, abnormal results deserve the physician's best efforts to maintain confidentiality, because they may affect the patient's employability, insurability, and personal relationships. At present, no professional organization recommends drug testing in apparently healthy people.

Physicians must learn to think of drug abuse as a chronic disease. Recidivism after intensive treatment programs is very common, no doubt in part because psychiatric disorders, unemployment, and homelessness often coexist with drug abuse. On the other hand, treating heroin abuse with maintenance methadone, an opioid agonist, can dramatically reduce the social effects of abusing the drug. Heroin addicts in methadone maintenance programs report less use of heroin and reduced rates of HIV infection, criminal behavior, and unemployment. Newer approaches to relapse prevention include the use of L-alpha acetyl-methadol and buprenorphine.³³ There is no similarly effective treatment for cocaine addiction.

Although at present, pharmacologic treatment for heroin dependence is provided primarily in special drug treatment settings, research indicates that these treatments can be provided effectively in physicians' offices.^{33,34} Changes in the law now encourage methadone maintenance in office practice. Physicians who wish to treat their regular patients will need to learn about the new regulations and the logistics of providing methadone maintenance.³⁴

Health Risks from Accidents and Violence

A person's environment contains many threats to health: motor vehicle accidents, accidents in the home, recreation-related accidents, and domestic violence. Passive strategies, which change the environment in which accidents can occur, are generally more successful at accident prevention than active strategies, which require people to change their behavior. Improving roads saves more lives than exhorting people to drive carefully. For a fuller account, refer to the report of the USPSTF² and to a comprehensive review published in 2007.³⁵

MOTOR VEHICLE INJURIES

Motor vehicle accidents are the leading cause of loss of potential years of life before age 65. Alcohol-related accidents account for 44% of all motor vehicle deaths. Motor vehicle accidents can affect occupants, pedestrians, and bicycle or motorcycle riders.

Injuries to Motor Vehicle Occupants

In 2006, 42,642 people died of injuries sustained in motor vehicle accidents in the United States.³⁶ The two greatest risk factors for death while one is driving a motor vehicle are driving while intoxicated and failing to use a safety belt. The physician's role is to identify patients with alcoholism [see *Alcohol Abuse, above*], to inquire about safety-belt use, and to counsel people to use safety belts and child car seats routinely. Overall observed safety belt use rate in the United States has been rising steadily, from 58% in 1994 to 80% in 2004. Restraint use is lower in the 25- to 34-year old age group; in 2005, 66% of the passenger vehicle occupants in this age group who were killed in traffic crashes were not using restraints—the highest percentage for any age group.³⁷ According to the USPSTF, the current evidence is insufficient to assess the incremental benefits of counseling on seat-belt use in the primary care setting, or to assess the balance of benefits and harms of routine counseling of all primary care patients against driving while under the influence of alcohol or riding with drivers who are alcohol-impaired.³⁸ Nevertheless, asking about seat-belt use and driving while intoxicated takes very little time.

In one study, 53.5% of patients in a university internal medicine practice did not use safety belts. Problem drinking, physical inactivity, obesity, and low income were indicators of nonuse. The prevalence of nonuse was 91% in people with all four indicators and only 25% in those with no indicators.³⁹ Although safety belts confer considerable protection, only 3.9% of the patients in this study reported that a physician had counseled them about using safety belts.

Three-point restraints reduce the risk of death or serious injury by 45%.⁴⁰ Air bags reduce the risk of death by an additional 6% in drivers using seat belts.⁴¹ Because air bags reduce the risk of death by only 14% in unbelted drivers,³⁹ physicians must tell their patients not to rely on air bags.

Injuries to Motorcyclists

Motorcycle deaths in the United States have been rising since 1997, reaching 4,810 in 2006.³⁶ The chance of death per mile while riding a motorcycle is 35 times higher than while riding in an automobile. Most deaths are caused by head injuries. Helmets reduce the risk of a fatal head injury by 27%, but only 50% of riders use helmets.⁴² Laws mandating helmet use are quite effective; the rate of helmet use rose to 95% in California after passage of a law, and the rate of head injuries dropped by 34%. Substance abuse is very common among injured motorcyclists.

Physicians should inquire about motorcycle use. They should redouble efforts to screen for substance abuse in motorcyclists and should recommend using helmets.

Injuries to Pedestrians

Pedestrian injuries caused by motor vehicles accounted for 4,784 deaths in 2006, a 27% decrease from 1990. Children are at greatest risk for injury. Among adults, the elderly are at greatest risk, principally because of sensory deficits, locomotor disability, and inability to process simultaneous stimuli.

Injuries to Cyclists

In 2006, 773 people died from bicycle injuries in the United States.³⁶ Children are at greatest risk. Head injuries account for two thirds of hospitalizations and three quarters of deaths related to bicycling. A meta-analysis of case-control studies showed that use of safety helmets reduced the risk of head injuries by 63% to 88%.⁴³ Helmets are effective for all ages and provide pro-

tection even in collisions with motor vehicles. Community-based education efforts have raised the rate of helmet use to 50%. Physicians should ask about bicycle use and counsel riders to use safety helmets.

INJURIES FROM FALLING

Falling is a serious health risk for older persons [see Table 7]. The lifetime risk of hip fracture, perhaps the most important consequence of a fall, is 40% for a 50-year-old woman. One approach to reducing the risk of hip fracture is to prevent osteoporosis. Strategies for prevention of osteoporosis include supplementation of vitamin D and dietary calcium intake, and drugs that increase bone mass, such as etidronate and alendronate. In a cohort study, weight-bearing exercise, such as walking, was associated with a 40% lower risk of hip fracture in women and a 50% lower risk in men.⁴⁴ Exercise works in part by increasing bone mass and in part by reducing the likelihood of a fall through the improvement in strength and balance. Combined interventions that included home visits, modifying home hazards, and exercise and gait programs reduced the risk of falls by 31% in a randomized clinical trial.⁴⁵ A meta-analysis found that interventions likely to be beneficial in preventing falls included the following⁴⁶:

- Screening/intervention programs in the community and in residential care facilities
- An individualized program of muscle strengthening and balance retraining
- Home hazard assessment and modification for older persons with a history of falling
- Withdrawal of psychotropic medication
- Cardiac pacing for patients with cardioinhibitory carotid sinus hypersensitivity who have experienced falls
- Tai Chi.

Physicians should identify patients who are at greatest risk for falling [see Table 7], treat osteoporosis, and link the patient to community-based programs for improving mobility and reducing hazards in the home. Although earlier studies had suggested a protective benefit from wearing pads over each hip, two meta-analyses have shown that there is little evidence to support the use of hip protectors, except possibly in nursing home residents, and that the discomfort and impracticality of these pads leads to poor acceptance and adherence by users.^{47,48}

INJURIES FROM FIRE

Prevention of death from fires is an example of a successful passive strategy. Smoke detectors prevent fire injury. A study in Oklahoma City measured the effects of door-to-door distribution of smoke detectors to residents of an area that had much higher rates of burn injuries than the rest of the city. The fire-injury rate declined 80%, to the same level as that in the rest of the city. The injury rate per fire also declined dramatically.⁴⁹ Physicians should inquire about smoke detectors in the home and recom-

mend them to people who don't have them. Persons who are alcohol dependent or who smoke in bed are at high risk and need special effort.

DROWNING

In most instances of witnessed drowning, bystanders report that the victim becomes motionless while swimming or simply fails to surface after a dive. Struggle is unusual. This observation raises the possibility that many cases of drowning occur when something such as a seizure, an arrhythmia, or an injury occurs.⁵⁰

All victims of immersion have hypoxemia. Aspirated freshwater is hypotonic and therefore rapidly absorbed by the pulmonary circulation and distributed throughout the body water compartment. Freshwater alters pulmonary surfactant and causes alveolar collapse and atelectasis. Saltwater is hypertonic and draws water into the alveoli, causing perfused but poorly ventilated alveoli and hypovolemia with concentration of electrolytes. The end result with both types of water is venous admixture and hypoxemia, often resulting in metabolic acidosis. Saltwater drowning often leads to hypovolemia as well.

The main goal of treatment is to prevent brain injury.⁵⁰ The first step is to initiate cardiopulmonary resuscitation if the victim is apneic and pulseless. The American Heart Association recommends abdominal thrusts only to clear the airway in case of suspected foreign-body aspiration or failure to respond to artificial ventilation. Supplemental oxygen is indicated if the patient is hypoxemic. The most effective single treatment of hypoxemia is continuous positive airway pressure (CPAP), using mechanical ventilation to expand collapsed alveoli caused by freshwater immersion.⁵⁰ Hypothermia, which often accompanies near-drowning, can protect the brain from injury by reducing its metabolic requirements when the patient is hypoxemic.

Most efforts to prevent drowning focus on children. The passive strategy of requiring fencing around swimming pools is associated with reduced drowning rates. In adults, alcohol ingestion is a risk factor for drowning. The efficacy of personal flotation devices is not known. Relatively few boaters (14%) wear personal flotation devices, but this rate is similar to that of drowning victims. Physicians should ask patients whether they use boats recreationally and advise those who do to avoid alcohol and use a personal flotation device while boating.

DOMESTIC VIOLENCE

For women especially, the home is the most dangerous place [see 16:XX Domestic Violence]. In one large study of women in a primary care clinic, one in 20 had experienced domestic violence in the previous year, one in four had experienced it as adults, and one in three had experienced it in their lifetime.^{51,52} Among those abused in the previous year, approximately equal numbers had been abused once, two or three times, or four or more times. In this study, the definition of domestic violence was an affirmative answer to the question "Have you been hit, slapped, kicked, or otherwise physically hurt by someone?" or "Has anyone forced you to have sexual activities?" Generally, a husband, ex-husband, boyfriend, or relative is the abuser in domestic violence.

Most of the literature on domestic violence focuses on screening, diagnosis, and management, rather than on preventing the first episode. Screening for domestic violence typically occurs in the office practice setting. Many authorities recommend that physicians routinely ask about domestic violence as part of the screening history.^{52,53} Nevertheless, in a national household telephone survey conducted in 2000-2001, only 7% of women re-

Table 7 Risk Factors for Falls among the Elderly⁴²

Prior falls	Low body mass index
Cognitive impairment	Female sex
Chronic illness	General frailty
Balance and gait impairment	Hazards in the home

Domestic Violence Information on the Internet

Medical Resources

Family Peace Project

http://www.family.mcw.edu/d_FamilyPeace.htm

Domestic Violence: A Practical Approach for Clinicians

http://www.sfms.org/Content/NavigationMenu/Home/About_SFMS/SFMSFoundation/Domestic_Violence_B.htm

Legal Resources

Women's Law Initiative

<http://www.womenslaw.org>

American Bar Association Commission on Domestic Violence

<http://www.abanet.org/domviol/home.html>

ported having ever been asked about domestic or family violence by a health care professional.⁵⁴

Appropriate communication may facilitate disclosure of abuse. In one study, effective measures included asking additional questions on the topic, providing open-ended opportunities to talk, and being generally responsive to patient clues.⁵³ For women who have children with them in the office visit, in which case less graphic language may be appropriate, an effective question for eliciting a history of domestic violence is, "How do you and your partner work out arguments?"⁵⁶

Domestic violence occurs in homosexual relationships as well, so it is best to ask both men and women. Some physicians introduce the question by saying that they are now asking all their patients about domestic abuse, in view of the growing awareness of the problem. Then they ask, "At any time [or since I last saw you] has your husband [lover, partner, boyfriend] hit, kicked, threatened, or otherwise frightened you?" If the patient replies in the affirmative, the physician should gather more information, including the name of the abuser, and record it. Because many people are ashamed of their situation and their inability to break out of it, the physician should avoid any judgmental statements other than to confirm that what is being done to the patient is wrong.

In many cases, patients will not disclose an abusive relationship but their medical and social history contains clues to the true situation. Somatic symptoms that are particularly indicative (prevalence ratio > 2.5) of an abusive relationship include multiple symptoms (especially with no apparent physical cause), poor appetite, nightmares, eating binges, pain in the pelvic region, vaginal discharge, musculoskeletal injuries, and diarrhea.⁵⁴ Even more indicative are emotional symptoms such as high anxiety, severe depression, a high level of somatization, and low self-esteem; current or past use of street drugs; positive items on the CAGE questionnaire for alcohol abuse; a current or past drinking problem; a husband or partner who abuses alcohol or uses street drugs; a history of suicide attempt; and abuse as a child (prevalence ratio > 10.0 for all of these).^{54,57} Pregnancy is often associated with an escalation of violence.

Some abused patients will disclose a history of abuse, but many will not. Therefore, during the physical examination, the physician should be alert to signs of injury. One expert states that a woman who presents with any injury should be considered a victim of domestic abuse until proved otherwise.⁵² Trauma to the face, abdomen, breasts, or genitals is especially likely to be from domestic abuse, as are bilateral or multiple injuries, injuries in

different stages of healing, and injuries that occurred well before the patient sought help. Injuries to the ulnar aspect of the forearms may occur as a woman raises her hands to protect herself during an assault.

Older persons are subject to several forms of abuse: self-neglect or caregiver neglect, emotional and psychological abuse, fiduciary exploitation, and physical abuse. Signs of elder abuse include bruising and other signs of trauma, malnutrition, volume depletion, and poor hygiene.⁵⁸

The physician should communicate concern and validate the patient's belief that domestic abuse is wrong. The physician should not only provide medical treatment of injuries but also talk with the patient about how to avoid serious injury during an assault, review the patient's options, and facilitate referral to community and other resources for abused partners [see *Sidebar Domestic Violence Information on the Internet*].

INJURIES FROM FIREARMS

The rate of death by firearms in the United States peaked at 39,595 in 1993, and it has since declined, reaching 29,569 in 2004.^{59,60} Firearms accounted for 649 accidental deaths, 11,250 homicides, and 16,603 suicides in 2004.⁶⁰

In two large communities, 58% of suicide victims used a firearm. Seventy percent of the suicides occurred at home. Firearms kill more teenagers than all natural causes of death combined. The Bureau of Alcohol, Tobacco and Firearms estimates that there are 192 million firearms in private hands. Firearms, often bought for protection in the home, are far more dangerous to the occupants than to an intruder. After controlling for other suicide risk factors, the odds of suicide are 1.9 times greater in homes in which there is at least one gun.^{61,62} The odds of homicide are 2.2 times higher in homes in which there is a firearm.⁶³

Physicians strongly support regulation of firearms and community efforts to restrict ownership.⁶⁴ Physicians also have a role to play in preventing injury from firearms.⁶⁵ They should inquire about firearms in the home and counsel owners about storing their firearms in a locked container in a safe place. With the increased number of teenagers who own guns and commit homicide with guns, parents must be educated about the dangers of firearms in the home. The American Academy of Pediatrics has developed an information kit for physicians to use in counseling parents and children. The kits, called Steps To Prevent Firearm Injury in the Home, are available without charge from the Brady Center to Prevent Gun Violence, 1225 Eye Street NW, Suite 1100, Washington, DC 20005, or they can be obtained on the Internet, at <http://www.bradycenter.com/stop2/>.

The author has no commercial relationships with manufacturers of products or providers of services discussed in this chapter.

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Acknowledgment

Figure 1 Marcia Kammerer. Adapted from Life table from the Vital Statistics of the United States, 1999.